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Filed : September 5, 2003

### REMARKS

This paper is in response to the final Office Action dated February 21, 2007. In reply, Applicant requests continued examination of this application. Applicant has amended the application as set forth above. Specifically, Claims 23-47 have been canceled without prejudice and new Claims 48-67 have been added. Upon entry of the amendments, Claims 48-67 will be pending in this application. No new matter is added by the amendments as discussed below. Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the above amendments and the following remarks.

#### Discussion of Amendments to the Claim

New Claim 48 is supported by the original specification and the drawings. Specifically, among others, original Claim 1, Figures 4 and 5 and their description in the original specification support the features of providing iris image data, performing a Daubechies wavelet transform, selecting one from the multiple pieces of transformed image data, repeating the Daubechies wavelet transform, and forming a characteristic vector. The feature of providing a reference characteristic vector of a registered iris image is supported by, for example, original Claim 15. The features relating to the quantitized pixel values of the characteristic vector are supported by, for example, paragraphs 47 and 48 of the original specification. The feature of creating an inner product is supported by, for example, paragraph 52 of the original specification and original Claim 18. The feature of determining whether the iris image of the eye matches with the registered iris image is supported by, for example, paragraphs 55-58 of the original specification.

New Claims 49 and 50 are supported by the original specification and the drawings, for example, paragraphs 47 and 48 of the original specification. New Claim 51 is supported by the original specification and the drawings, for example, Figure 4 and its description of the original specification. New Claim 52 is supported by the original specification, for example, paragraphs 55-58 of the original specification. New Claim 53 is supported by the original specification, for example, paragraphs 55-58 of the original specification. New Claims 54-63 are supported by the original specification, for example, original Claims 2-11, respectively. New Claims 64-65 are supported by the original specification, for example, original Claims 13-14, respectively.

New Claim 66 is supported by the original specification and the drawings, for example,

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original Claims 15-18 and Figures 4 and 5. New Claim 67 is supported by the original specification and the drawings, for example, original Claims 21-22 and Figures 4 and 5.

As such, new Claims 48-67 adds no new matter. Thus, Applicant respectfully requests the entry of the amendments to the claims.

#### Discussion of Rejections Under 35 U.S.C. §103

The Examiner rejected Claims 23-47 under 35 U.S.C. § 103 (a) as being unpatentable over Daugman (U.S. Patent No. 5,291,560), and further in view of Daubechies et al. (Image Coding Using Wavelet Transform, IEEE Transactions on image processing, Vol. 1, No.2, April 1992). Applicant respectfully disagrees with the Examiner and submits that Claims 23-47 are patentable over the cited references. However, solely in order to clarify the features of the invention, Applicant has canceled Claims 23-47 without prejudice and added new claims, Claims 48-67. In view of cancellation of Claims 23-47, the rejection is now moot.

#### Patentability of New Claims

Applicant would like to discuss patentability of new Claims 48-67 over the references relied on in the Office Action.

#### Law of Obviousness

The Patent and Trademark Office has the burden under section 103 to establish a *prima facie* case of obviousness. *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-87 (Fed. Cir. 1984). To establish a *prima facie* case of obviousness, three basic criteria must be met: first, the prior art reference (or references when combined) must teach or suggest all the claim limitations; second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; finally, there must be a reasonable expectation of success. *See* M.P.E.P. § 2143.

#### Claim 48

Claim 48 is directed to a method of processing iris image data. This method includes the features of performing a Daubechies wavelet transform on an iris image data so as to create multiple pieces of transformed image data, and selecting one from the multiple pieces of

transformed image data. The method further includes the features of repeating to perform the Daubechies wavelet transform on a piece of image data so as to create additional multiple pieces of transformed image data and subsequently to select one from the additional multiple piece of the transformed image data. Here, the piece of image data on which the Daubechies wavelet transform is repeated is the selected piece that is selected in the immediately previous selecting step. Also, performing the Daubechies wavelet transform and subsequently selecting are repeated at least once.

The method of Claim 48 further includes, upon completion of the repeating step, forming a characteristic vector of the iris image of the eye, which comprises quantatized pixel values of the selected piece of transformed image data that is selected in the last selecting of the repeating step. Here, the quantitized pixel values comprise at least two positive values and at least two negative values. Then, the method includes the features of computing an inner product of a reference characteristic vector and the characteristic vector of the iris image of the eye, and determining whether the iris image of the eye matches with the registered iris image based on a value of the inner product.

#### Disclosures of References

**Daugman** discloses an iris image analysis using 2-D Gabor band pass filters and discretization. Daugman takes luminance signals of an iris image in the analog form and filters the analog signal using a Gabor filter. The Gabor filter removes some high frequency components of the iris data. See Figures 4A and 4B. Then, Daugman digitize the filtered signal to generate a code representing the iris image using two values (0 and 1) only. See Figure 4C. The digitized code is compared with a previously stored iris code for determining whether the iris image matches that of the stored iris image. In determining, the digitized code and the previously stored iris code are computed using the XOR (Exclusive-OR) logic to obtain a Hamming distance between the digitized code and the previously stored code.

However, Daugman does not produce multiple pieces of image data using a wavelet transform. Daugman does not select one of the multiple pieces of transformed image data. Daugman does not repeat any form of wavelet transforms on selected pieces of image data that is selected immediately previous selection steps. Daugman's digitized code is not represented with

at least two positive values and at least two negative values. Nor does Daugman disclose computing an inner product of the digitized code and the previously stored iris code.

Daubechies discloses an image compression technique using wavelet transform. Daubechies takes image data and performs the Daubechies wavelet transform on the image data. In order to reduce the size of image data, Daubechies further performs the wavelet transform multiple times on one of the pieces of image data created in the immediately previous transform.

Daubechies also discloses reconstruction of an image using the transformed image data that is created by its multiple wavelet transforms. Daubechies does not create a characteristic vector from the transformed image data. Nor does Daubechies quantatize the pixel values of the transformed image in the characteristic vector or create the characteristic vector with quantatized pixel values. This is very consistent with the purpose of Daubechies, which is to provide an image data compression technique and reconstruction of a compressed image data, because using the wavelet transformed data to create a characteristic vector or further to quantatize the transformed data would make it impossible to reconstruct the image from the wavelet transformed data. Absent forming a characteristic vector, Daubechies is not even concerned or interested in computing an inner product of that vector and another vector to determine the relationship between the two vectors.

No Prima Facie of Obviousness is Established

In view of the foregoing, neither Daugman nor Daubechies discloses the features of Claim 48 that the characteristic vector comprises quantatized pixel values of the selected piece of transformed image data and that the quantitized pixel values comprise at least one positive value and at least one negative value. Further, Daugman and Daubechies do not disclose computing an inner product of a characteristic vector and a reference characteristic vector. With these alone, the combination of Daugman and Daubechies does not establish a *prima facie* case of obviousness.

Further, there is no reason to modify the combination of Daugman and Daubechies to reach Claim 48. Applicant notes that Daugman forms a digitized code representing an iris image using 0 and 1. There is no sound reason for changing the digitized code of Daugman in 0 and 1 to quantitized pixel values which comprise at least two positive values and at least two negative values as in Claim 48. If the combination of Daugman and Daubechies is motivated to minimize

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the size of the data for saving CPU time, as asserted by the Examiner (see the final Office Action page 4, lines 5-7,) it would be unreasonable to increase the size of the data by representing the image data utilizing at least four values (at least two positive values and at least two negative values).

Moreover, it would have been unreasonable for an ordinary skill in the art to change the XOR logic computation of Daugman to the inner product of characteristic vectors as in Claim 48. Given the formats of the digitized code of Daugman and the characteristic vectors of Claim 48, the computation of XOR logic of Daugman's digitized codes would be far less CPU-time consuming than the computation of inner product of Claim 48's characteristic vectors. Changing less CPU time to more CPU time would be unreasonable, again if the combination of Daugman and Daubechies is motivated to minimize the size of the data for saving CPU time, as asserted by the Examiner.

For these additional reasons, Daugman and Daubechies do establish a *prima facie* case of obviousness. In view of the foregoing, Applicant submits that Claim 48 is in condition for allowance.

#### Dependent Claims

Although Applicant has not addressed all the issues of the dependent claims, Applicant respectfully submits that Applicant does not necessarily agree with the characterization and assessments of the dependent claims made by the Examiner, and Applicant believes that each claim is patentable on its own merits. Claims 49-67 are dependent either directly or indirectly on the above-discussed independent Claim 48. Applicant respectfully submits that pursuant to 35 U.S.C. § 112, ¶4, the dependent claims incorporate by reference all the limitations of the claim to which they refer and include their own patentable features, and are therefore in condition for allowance. Therefore, Applicant respectfully requests the withdrawal of all claim rejections and prompts allowance of the claims.

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### CONCLUSION

The Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. In view of Applicant's amendments to the claims and the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Should the Examiner have any remaining concerns, which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

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